

GOOD PRACTICES

INTERGENERATIONAL PARTNERSHIP IN RESEARCH AND DEVELOPMENT ACTIVITY

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Abstract

The emergence, spreading and dissemination of scientific knowledge currently surpasses the capacity of assimilation and processing by one individual, requiring multidisciplinary and multigenerational team research. The need of interaction and networking uptakes more and more in the management of research-development and innovation (RDI) due, on the one hand, to the growth of its complexity in the knowledge-based economy and, on the other hand, to the urgent need of researchers to come up with solutions for the pressing socio-economic issues.

International experience proves that high individual professional quality is not enough for a successful research team. It requires collaboration, including an efficient intergenerational partnership acting in a working environment based on responsibilities, merit acknowledgement, risk-taking, kindness, support, good standards, conflict-avoidance (except for conflicts of ideas) as well as on the scientific identity of every researcher, irrespective of their age. Recognition of scientific and managerial complementarities of the research team members and reciprocal respect for personal values ensures the most efficient valorization of researchers potential within the team.

The appreciation and recognition given to the collaborative work are important factors for creativity and success, given the positive relationship between these factors and the quality and quantity of the research output. The research and development (R&D) activity performance is greater when decisions, objectives and priorities are collectively established, since research activity is no more an individual effort, but a consequence of team work contribution.

The paper presents the research results regarding the way in which the above mentioned aspects are reflected in R&D intergenerational partnership in Romania, revealing its typology and characteristics, the age structure trends of research teams, as well as the factors that stimulate or hinder cooperation between young researchers and the more experienced ones.

Keywords: intergenerational partnership, research-development, efficient teams, scientific complementarity

JEL Classification: O32, O39, O38, J24

Introduction

The interest for the intergenerational partnership in research, development and innovation (RDI) was generated by the aim of the authors to bring a theoretical and empirical contribution to this issue that was less approached in the economic literature.

Following the hypothesis that successful research team depends not only on the scientific and professional profile of its individual members, but also on the variety of psychological and social factors, which ensure a suitable environment for efficient cooperation, we had seek the answer to the questions such as : Is there a correlation between research team performance and the collaboration of its members of different ages? Which is the specific role of the different age generations within a research team? Is there a special influence of different types of research (fundamental and applied), as well as of different scientific fields on the R&D intergenerational partnership? What is the intergenerational partnership typology in Romanian research activity and how could be stimulate its efficiency?

In order to address the issue, we investigated a wide range of literature from R&D and innovation field but also from border scientific fields, such as human resources management, organizational behaviour, etc. We gathered, also, relevant data and information conducting interviews with representatives of different generations of researchers, from various research fields and with different position within the team (managers, team-leaders, executants, administrative personnel, etc.).

These qualitative information complemented statistical data got from different sources and allowed us to identify the main models of Romanian R&D intergenerational partnership and to depict the characteristics of an efficient management, both the research team and R&D field, aiming to achieve high-quality scientific output, as well fastening the development of young researchers careers.

1. Efficient Research Teams Particularities

Theoretical and empirical studies have revealed direct linkage between research team performance and the cooperation degree of its members. A high level of specialized knowledge, or a rich experience in the research-development and innovation (RDI) field are insufficient in order to achieve high performances in a research team if there is no wish and ability for good cooperation.

Specialists (Brett, 2003) claim that efficient research teams are characterized by **diversity**, that can generate both contacts and cooperation relationships, and creative and positive tension. Team work has to be based on the acceptance and appreciation of various opinions, ways of thinking, attitudes and mentalities of its members.

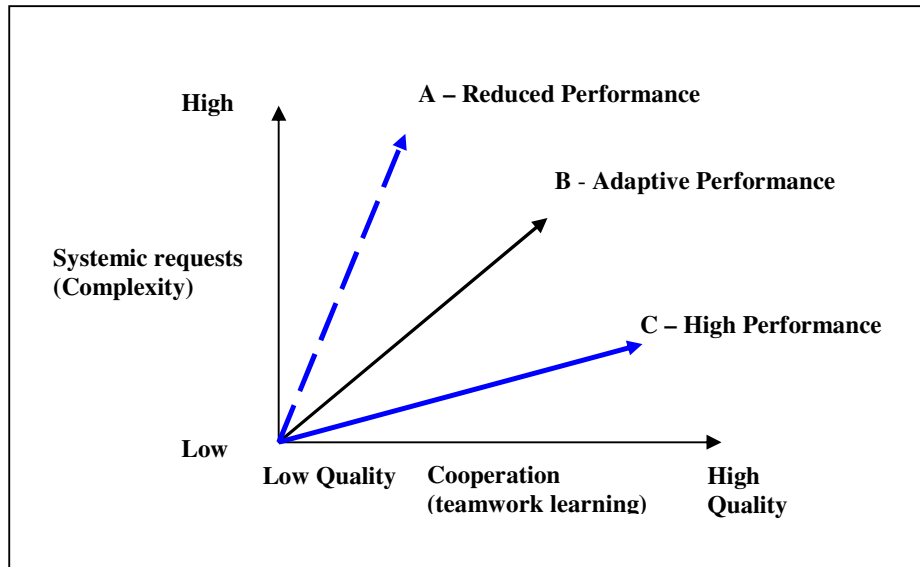
The approach of diversity **as opportunity and not as a threat**, the ability to creatively value it enrich the dynamics and flexibility of the team as a system, its capacity to learn and cooperate as well as to adapt to change.

Figure no. 1 suggests the interdependence between the team learning process, its performance and the level of adaptability to the changes imposed by the system where it functions.

Line A – signifies the fact that when the change requirements rate grows faster than the team's ability to learn and cooperate, its performance decreases.

Line B – represents the situation where the team proficiency decreases in spite of the team's keeping up with the dynamics of the environment change, under the circumstances of a shock, an emergency or unexpected and unforeseeable profound change.

Line C – shows the optimal rate of team learning process and cooperation abilities usage that lead to the highest achievements. If these team characteristics vanish, then lines B and C can alter their trajectory, moving towards line A.



Source: Brett Richards: "Intelligent Teams: The Dynamics of Collaboration"

Figure 1 The relationship between the cooperation degree, the learning capacity and the performance of the research team

Life-long learning in the RDI teams involves both the interaction between the various age groups researchers and efficient channels for transferring the accumulated knowledge from the more experienced researchers onto the following generations (Hyttinen and Rintala, 2005). Intelligent cooperation urges various age groups researchers to accept the diversity of their thinking, acting methods and interaction models, as well as emotional self-containment, especially when the team is doing competitive fund-raising under the pressure of a limited amount of time to come up with efficient solutions.

The *quality* of researchers' interactions can be stimulated by the organization, through the appreciation and rewarding of not only the scientific merit of the researchers but also of their capacity to cooperate and integrate in a research team.

Experts (Kratzer and Takacs, 2004; Santanu and Dhawan, 2005) have proven that a differentiated researchers' age structure contributes positively to the individual perspectives within the team due to the complementarities between the expectations of younger researchers, that are more mobile and eager to rapidly achieve success, on the one hand,

and the scientific prestige of the older ones, on the other hand, the latter being in a position to mentor the young who have decided to become scientific researchers.

The working conditions in research and development (R&D) field play an important role in achieving great success. Literature in the R&D organization management field (Litwin and Stringger, 1998) identifies nine dimensions to the working milieu: the team's adequate structure; responsibility assumption; merit acknowledgement; risk-taking; team-members' kindness; mutual support; high standards; conflicts of ideas not of interests; the scientific identity of every participant.

Efficient leaders are vital to a successful research team. They need to anticipate potential threats and make all the efforts to provide the team with the adequate information, instruments and abilities in order to ensure a high and sustainable performance.

The appreciation and recognition of the input of the research team members represent important determiners of creativity and performance, given the positive relationship between these factors and the quantity and quality of research output. Empirical studies (Pelz and Andrews, 1996) have concluded that R&D activity performance is greater when decisions and objectives are established in a participative way, and when research is not perceived as a result of individual efforts, but as team contribution.

The research team that can ensure an efficient intergenerational partnership in Romania should feature the following characteristics, in our opinion:

- The presence of experienced and successful researchers in the team, whose national and international fame is beyond any doubt and whose role is usually to draw up innovating directions and new slots in the studied field.
- Experienced researchers must cooperate with beginner researchers, guiding the latter in the documentation activity, data gathering, data processing and study writing.
- The research team must be preoccupied with capitalizing on research results and evaluating their scientific, economic, social or ecological impact.
- The sources of ideas within the team should be various: book research; statistic data and information, both official as well as from the economic and social environment targeted by the research; scientific dialogue and interdisciplinary debates between team members as well as between the team and outside specialists.
- "Auxiliary personnel" and the economic-financial managers must be integrated into the research team, especially due to their recent high degree of expertise regarding projects unfolding, financial reports procedures and contract negotiation, intellectual property rights, remuneration opportunities for researchers of special contributions.

2. The dynamics of the young labor force potential offer for R&D activity

Intergenerational cooperation is all the more important as there has emerged a tendency of aging on the part of scientific research personnel, both in Romania and at the EU 27 level. The dominant age group of RDI staff is between 45 and 64. For some countries, such as Latvia, Lithuania, Ireland, the United Kingdom, Slovakia, the Czech Republic, Denmark, Hungary, Portugal and even Romania, the group of researchers over 65, varies between 5,1% for Denmark and 9,5% Latvia. In Romania, this age group of the RDI staff was of 5,3 % in 2007 ([6], p.52), higher than for 2005. It should be noticed that the 25-34 age group researchers category has expanded in the total number of researchers in the 2005-2007 time period (table no.1). In this period, there was conducted the Excellence Research Program

that, by its opportunities and incentives, attracted valuable youth into the research teams involved into the elaboration of various projects.

**The Evolution of the Romanian Researchers Age Group Structure
for the Period 2005-2007**

Table no.1

(%)

| Year Age Group | 2005 | 2006 | 2007 |
|-------------------|-------|-------|-------|
| < 25 | 3,00 | 2,69 | 2,99 |
| 25-34 | 20,40 | 20,90 | 23,36 |
| 35-44 | 23,82 | 27,07 | 23,68 |
| 45-54 | 29,60 | 28,30 | 25,60 |
| 55-64 | 18,8 | 17,13 | 19,0 |
| ≥ 65 | 3,72 | 3,89 | 5,30 |

Source: The Statistical Yearbook of Romania, 2007, p.489 and The Statistical Yearbook of Romania, 2008, p. 543.

The higher education population represents the most important rejuvenating source for the current labor force in R&D. The "Science and Engineering Tertiary Education Graduates / 1000 Population in the 20-29 Age Group" indicator can be relevant for evaluating the potential of future researchers. Taking this aspect into consideration, Romania got the 16th place out of the 27 EU member states in 2005, according to the latest Eurostat data ([5], p.58), but it registered the highest growth rate in the 2000-2005 time period.

Special literature reveals a positive correlation between the intensity of tertiary education graduates and that of R&D personnel. Countries like Finland, Sweden, Norway, where the weight of graduates was very large, also featured the largest share of R&D employed personnel ([6], p.52). The employment of new groups of higher education graduates in the R&D activity is a vital factor for the renewing of the labor force in research as well as of the improvement of the age structure of the personnel in this field.

The National Strategy for Research, Development and Innovation that consolidates the National RDI Plan (NPRDI) for 2007-2013, argues in favor of the need for the increasing the Romanian RDI system's ability to attract, integrate and skill young researchers of high potential for success in research and innovation. This basic solution of human resources (HR) crisis in research is perceived as an efficient instrument to promote excellence in research, an essential component of the action strategy in achieving the strategic objective - *to create knowledge* with competitive scientific and technological results nationally and internationally. The objectives associated to the goal of *Development of the system resources*, concentrate on the rejuvenation of the human resources engaged in research and on its shaping for excellence.

This will be practically achieved through postgraduate, doctoral and post-doctoral programs and schools of excellence which, under the guidance of notorious mentors with acknowledged results in the field of research will ensure a proper training and the development of the capacity of future researchers to carry out advanced research projects; through grants and scholarships offered to young researchers for the unfolding and running

of research projects within doctoral programs, stimulating international co-tutelage and mobility, etc.

In the framework of the HR Program to which there are granted 1350 million RON - 9% of the budget pertaining to PNCDI 2, five out of the nine types of financed projects are directly allotted to young researchers, doctors, doctoral students, and to students who prove technical or artistic creativity: doctoral students mobility projects, research projects for the stimulation of researchers' return to the home country, research projects for young doctoral students, "Ștefan Odobleja" research scholarships, prizes for technical and scientific innovation and artistic creativity. Eligibility criteria set up age limits for applicants (35 or 40 years), and the selection is made on the basis of their performance and potential.

3. Intergenerational partnership in the RDI activity: types and characteristics

Intergenerational partnership becomes manifest through the complementarity between the experienced and young researchers. Older researchers bring greater abilities in doing research projects proposals, higher level of accumulated integrated knowledge in a certain scientific field, a wide relationship network and greater propensity and desire to cooperate.

On the other hand, young researchers contribute to the teamwork with their enthusiasm, higher documentation and data electronic processing capacity, experienced gained along postgraduate or postdoctoral education programmes they have attended to abroad, greater mobility, greater ability to adapt to electronic systems and procedures for accessing national and international funds and the determination to build a career in research.

The diversity of manifestation forms for the intergenerational partnership is due to myriad factors out of which an important role receives the type of the specific research activity. It can be noticed that in the exact sciences, creativity is generally greater in the first part of the professional activity, triggering higher weight of young people in research teams. However, great personalities, the creators of research schools, mentors and scientific advisors and coordinators are vital to the research team. As far as humanities are concerned, where experience counts more than in other fields, the participation of older researchers is absolutely necessary.

The typology of intergenerational partnership in RDI is various and comprises: team research; youth training programs, including Master, PhD and postdoctoral programs; collaborative work within national and international projects; cooperation in the elaboration of studies that will be presented at national and international conferences; publications in cooperation; short-term training schools, etc.

Our research made on the basis of a representative sample of teams involved in the various programs within PNCDI1 (2000-2006) outlined the following main forms of intergenerational partnerships:

- Research teams predominantly composed of more experienced researchers, from the university and academic background, that have superior performance indexes, inclusively through articles published in ISI ranking magazines or those ranked B or B+ by the National University Research Council (NURC);
- Research teams made up of consecrated researchers, young or older, coming from the academic milieu and teaming up with those from private organizations undertaking applied research activities. As far as performance is concerned, the results are pragmatic and of use to mainly national actors;

- Research teams made up of mostly young people with the desire to rapidly become successful and visible nationally and internationally, both through articles published as well as through experimental results. Graduates of post/university and postdoctoral studies in Romania or abroad, these are able to use modern means of research. The valuing and disseminating of the research results were also supported by the relationships and connections established between the young researchers from Romania and the universities abroad where they had studied.

Youth Involved in the R&D Activity for Some of the PNCDI1 Programs

Table no.2

| Research Programs | Youth under 35 Participation Degree % | Research Programs | Youth under 35 Participation Degree % |
|-------------------|---------------------------------------|-------------------|---------------------------------------|
| CORINT | 47,0 | AEROSPAȚIAL | 19,22 |
| AGRAL | 28,0 | CERES | 18,0 |
| SECURITATE | 26,81 | RELANSIN | 15,0 |
| MENER | 25,0 | CALIST | 13,0 |
| INVENT | 24,69 | AMTRANS | 9,0 |
| VIASAN | 21,42 | INFRAS | 7,1 |

Source: Authors' calculations and estimates based on the programmes managers' reports within PNCDI1, 1999-2006

Table no. 2 presents important variation regarding the youth participation degree among the PNCDI1 Research Programmes providing available data. The CORINT programme aroused the greatest interest for young researchers, as its objective was to promote the international cooperation and partnership programs, as well as to supply support steps with a view to the integration of the Romanian scientific and technological community into the European and international community.

An important supporting framework for the intergenerational cooperation in RDI in Romania is represented by the projects within the National Plan for Research, Development and Innovation. (NPRDI) "The Youth Participation Degree" being one of the criteria for the evaluation of projects proposals with a view to financing, represents a significant incentive for the young to take part to the elaboration of the financed projects both within the framework of PNCD1 as well as of PNCD2.

In the typology of intergenerational partnerships in RDI, Master and PhD programs are salient, due to the mentor-disciple relationship. Older researchers, as professors or doctorate coordinators, guide, educate and form young researchers, transferring unto them knowledge and experience.

The data regarding the more rapid evolution of the number of PhD graduates related to the number of employed people in R&D activity reflect the more and more significant role that this type of intergenerational partnership plays.

The outcome of this intergenerational partnership is:

- the elaboration of valuable research thesis by young Master or PhD students, who acknowledge the support and scientific guidance they have received from experienced researchers;

- the endowment of the youth with good research methodology and creativity sources held by the faculty;
- on-going partnership after graduation, due to the already built up team which have proven functional during the training period.

As a result of the *growth of the RDI labor force international mobility*, scientific intergenerational partnership emerged under at least two forms, as our analysis reveals:

- professors or experienced researchers from Romania cooperated with youth from RDI foreign institutes, in projects supported by community funds during the pre-integration period: PHARE, ISPA (e.g. INCO-COPERNICUS). To a large extent, the partnership with Romanian researchers benefited from complementary contributions of the young researchers coming from foreign EU universities, as well as from access to high-quality infrastructure and logistic systems that gave the formers the opportunity to do more reading, documentation, analysis and interpretation. This type of partnership derived from the foreign researchers' scientific interest in the Romanian economic and social particularities, as well as from the desire of the Romanian partners to value and disseminate their results within the international scientific community. The peculiarities of the field under study, given the circumstances of a transition economy, have often represented an issue of interest for the international research projects.
- PhD programs undertaken by young Romanian researchers in universities or research institutes from abroad represented a specific type of international intergenerational partnership. Young Romanian doctoral students have firstly benefited from cooperating with prestigious foreign researchers while, at the same time, being integrated into research teams during courses, lectures and the elaboration and presentation of their working papers within host universities. This type of partnership hasn't always been proved beneficial for Romania. Many of the young researchers that had left the country to get a doctoral degree did not find suitable and rewarding job opportunities at home. Thus, they were motivated to stay abroad and work for the universities where they had studied. Yet, it should be worth to underline the positive impact of this type of partnership for national research programs where specialized abroad young researchers worked together with the research fellow from the institutes they had left.

Conclusions

Our empirical and theoretical analysis revealed that the research team performance is determined – in Romania as well – by the professional value of its members along with consistent compliance with various principles (even ethical standards), which shape the interaction patterns, the behavior and management of the team. Excellent teams bring together researchers of different ages, which contribute to the team success with their specific qualities, competences and strengths, through cooperation and capitalization upon each other 's the best practices.

In the last years, in Romania, as well as abroad, has been observed an tendency of R&D personnel aging, expressed in a growing weight of older researchers in the research teams. This could lead to conflicts of interests and dissatisfactions that might be smoothed away through acknowledgement of complementarities between the member's attributions and contributions within the team , through appreciation of, and adherence to, the team scientific and human values of all team members, irrespective of age.

The research reveals the complex typology of intergenerational partnerships in the Romanian research and development activities, which allow for self-development and self-expression of both young and old researchers. In this context, the decision-makers in RDI policy and research team leaders play a significant role.

The promotion and sustaining of this kind of partnership is fostered through specific policy instruments, such as programme-based research funding, opened – on a competition basis – to both young and experienced researchers. Also, an important basis for increasing the share of youth in R&D personnel is the Research Development and Innovation National Plan for the period 2007-2013 (NPRDI 2) which contains some programmes targeted toward attracting young people in R&D (research scholarships in Romania and abroad, masteral and doctoral programs, etc). The „youth participation rate” represents a condition of eligibility for submitted proposals in an important programmes within NPRDI2, namely „Partnership in priority research areas”.

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